IEC 60034-27-4

Edition 1.0 2018-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Rotating electrical machines –
Part 27-4: Measurement of insulation resistance and polarization index of winding insulation of rotating electrical machines

Machines électriques tournantes –
Partie 27-4: Mesure de la résistance d'isolement et de l'index de polarisation sur le système d'isolation des enroulements des machines électriques tournantes

IEC 60034-27-4:2018-01(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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The text of this International Standard is based on the following documents:

FDIS	Report on voting
2/1880/FDIS	2/1890/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60034 series, published under the general title *Rotating electrical machines*, can be found on the IEC website.

NOTE A table of cross-references of all IEC TC 2 publications can be found in the IEC TC 2 dashboard on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document provides guidelines for measurement of the insulation resistance and the polarization index on stator and rotor winding insulation of rotating electrical machines. The document also describes typical insulation resistance characteristics, the effect of influential factors which impact or change these characteristics, and how these characteristics indicate winding condition. It recommends minimum acceptable values of insulation resistance for AC and DC rotating machine windings. Interpretation will depend on the nature of the insulation materials – specifically if the insulation is of the thermoset or thermoplastic type.

Insulation resistance measurement has been recommended and used for over 50 years to evaluate the condition of electrical insulation. It is recommended to track periodic measurements, accumulated over months and years of service or in connection with servicing and overhaul of rotating machines.

Empirical limits verified in practice can be used as a basis for evaluating the quality of stator winding insulation systems in manufacturing. Furthermore, trend evaluation, e.g. diagnostic tests as part of the functional evaluation of insulation systems or in connection with servicing and overhaul of rotating machines, can also provide information on ageing processes, possible repair options and the recommended time interval between tests. These measurements give no indication of local weak points in the insulation system and the trend evaluations cannot be used to predict the time to failure of the winding insulation.

ROTATING ELECTRICAL MACHINES –

Part 27-4: Measurement of insulation resistance and polarization index of winding insulation of rotating electrical machines

1 Scope

This part of IEC 60034 provides recommended test procedures for the measurement of insulation resistance and polarization index of stator and rotor winding insulation of rotating electrical machines.

This document recommends minimum acceptable values of insulation resistance and polarization index of winding insulation valid for fully processed low and high voltage AC and DC rotating electrical machines with a rated power of 750 W or higher.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-411, *International Electrotechnical Vocabulary – Chapter 411: Rotating machinery*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-411 and the following apply.

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- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
rated voltage
<for an electric machine> rated line-to-line voltage for a three-phase AC machine, line-to-earth voltage for a single phase machine and rated direct voltage for DC machines or field windings

3.2
insulation resistance
R_{it}
<for an electric machine> capability of the electrical insulation of a winding to resist direct current and is determined by the quotient of the applied direct voltage divided by the total current across the machine insulation, taken at a specified time *t* from start of voltage application

Note 1 to entry: The voltage application time is usually 1 min (R_{i1}) and 10 min (R_{i10}); however other values can be used. Unit conventions: subscript values of 1 through 10 are assumed to be in minutes, subscript values of 15 and greater are assumed to be in seconds.

Note 2 to entry: Insulation resistance is sometimes abbreviated as IR.